

CLAIMS

What is claimed is:

- 1           1.     A data transmission system, comprising:  
2                     a differencing transmitter transmitting at least one set of  
3                     difference transactions; and  
4                     a differencing receiver receiving said at least one set of  
5                     difference transactions.
  
- 1           2.     The data transmission system of claim 1 wherein said  
2                     differencing transmitter is coupled to a data source and said difference  
3                     transactions comprise changes to said data source.
  
- 1           3.     The data transmission system of claim 2 wherein said  
2                     differencing receiver includes a data destination to which said difference  
3                     transactions are to be applied.
  
- 1           4.     The data transmission system of claim 1 wherein said  
2                     differencing transmitter is provided in a device having at least one data  
3                     source.
  
- 1           5.     The data transmission system of claim 4 wherein said  
2                     differencing receiver is provided in a system including a data destination.
  
- 1           6.     The data transmission system of claim 5 wherein said change  
2                     transactions comprise changes from the data source to the data  
3                     destination.

1           7.     The data transmission system of claim 1 wherein said  
2     differencing transmitter comprises:

3                 a difference source interface;

4                 a copy of a previous state of said difference source; and

5                 a difference transaction generator.

1           8.     The data transmission system of claim 7 wherein said  
2     difference source interface converts difference source data to a universal  
3     format.

1           9.     The data transmission system of claim 8 wherein said  
2     differencing transmitter includes a plurality of difference source interfaces.

1           10.    The data transmission system of claim 1 wherein said  
2     differencing receiver comprises

3                 a difference destination interface;

4                 a copy of a previous state of said difference destination; and

5                 a destination data constructor.

1           11.    The data transmission system of claim 10 wherein said  
2     difference source interface converts difference source data from a  
3     universal format to a difference source format.

1           12.    The data transmission system of claim 11 wherein said

2     differencing transmitter includes a plurality of difference destination  
3     interfaces.

1             13.     The data transmission system of claim 1 wherein said  
2     differencing transmitter and differencing receiver are coupled via a network

1             14.     The data transmission system of claim 13 wherein said  
2     network is the Internet.

1             15.     The data transmission system of claim 1 wherein said  
2     differencing transmitter and differencing receiver reside on the same  
3     device.

1             16.     The data transmission system of claim 1 wherein said  
2     differencing transmitter resides on a first device and said differencing  
3     receiver is coupled to a second device, and said first and second device  
4     include a connection for transmission of said difference transactions.

1             17.     The data transmission system of claim 1 wherein said  
2     differencing transmitter and differencing receiver are coupled to a storage  
3     server, and said difference information is transmitted to said storage server  
4     by said differencing transmitter and retrieved from said storage server by  
5     said differencing receiver.

1             18.     The data transmission system of claim 17 wherein said  
2     differencing transmitter and differencing receiver are coupled to said  
3     storage server via the Internet.

1           20.    The data transmission system of claim 19 wherein said  
2   management server authorizes access of difference information on the  
3   storage server by the differencing transmitter and differencing receiver.

21. The data transmission system of claim 20 wherein said management server indicates a location on the storage server where difference information for said differencing transmitter and differencing receiver are stored.

1           22.    The data transmission system of claim 3 wherein said  
2    differencing transmitter includes a source data reconstructor.

23. The data transmission system of claim 22 wherein the  
differencing receiver in said source data reconstructor receives at least a  
second set of change transactions for the source from the destination.

1           24. The data transmission system of claim 3 wherein said  
2    differencing receiver includes a destination data difference transaction  
3    generator.

1            25.    The data transmission system of claim 24 wherein said  
2    destination data difference transaction generator generates change

3 transactions from the destination data for the source.

1 26. The data transmission system of claim 2 wherein said  
2 differencing transmitter is provided on a server and said differencing  
3 receiver is provided in a device including said data destination.

1 27. The data transmission system of claim 26 wherein said data  
2 source is provided on a device coupled to the server and the differencing  
3 transmitter.

1 28. The data transmission system of claim 2 wherein said  
2 differencing receiver is provided on a server and said differencing  
3 transmitter is provided in a device including said data source.

1 29. The data transmission system of claim 28 wherein said data  
2 destination is provided on a device coupled to the server and the  
3 differencing transmitter.

1 30. The data transmission system of claim 2 wherein said  
2 differencing transmitter and differencing receiver are provided on a server,  
3 said data source is provided on a device coupled to the server, and said  
4 data destination is provided on a device coupled to the server.

1 31. A data transmission system coupled to a network,  
2 comprising:  
3 a differencing transmitter the transmitting at least one set of  
4 change transactions reflecting changes to a data source to the

5 network; and

6 a plurality of differencing receivers coupled to the network  
7 receiving said at least one set of change transactions from the  
8 network.

1 32. The data transmission system of claim 31 wherein at least  
2 one of said difference receivers includes a data destination to which said  
3 change transactions are to be applied.

1 33. The data transmission system of claim 32 wherein at least  
2 one of said differencing receiver is provided in a system including a data  
3 destination.

1 34. The data transmission system of claim 31 wherein said  
2 differencing transmitter comprises:  
3 a difference source interface;  
4 a copy of a previous state of said difference source; and  
5 a change transaction generator.

1 35. The data transmission system of claim 34 wherein said  
2 differencing transmitter includes a plurality of difference source interfaces.

1 36. The data transmission system of claim 31 wherein said  
2 differencing transmitter and differencing receiver are coupled via a network

1 37. The data transmission system of claim 36 wherein said

2 network is the Internet.

1 38. The data transmission system of claim 31 wherein said  
2 differencing transmitter and plurality of differencing receivers are coupled  
3 to a storage server, and said change information are transmitted to said  
4 storage server by said differencing transmitter and retrieved from said  
5 storage server by at least one of said differencing receivers.

1 39. The data transmission system of claim 31 further including  
2 a management server communicating with said differencing transmitter and  
3 said plurality of differencing receivers.

1 40. The data transmission system of claim 39 wherein said  
2 management server authorizes access of change transactions on the  
3 storage server by the differencing transmitter and differencing receivers.

1 41. The data transmission system of claim 31 wherein each said  
2 differencing transmitter includes a data source reconstructor.

1 42. The data transmission system of claim 41 wherein the  
2 differencing receiver in said data source reconstructor receives at least a  
3 second set of change transactions for the source from the destination.

1 43. The data transmission system of claim 31 wherein each said  
2 differencing receiver includes a destination data change transaction  
3 generator.

1           44.    The data transmission system of claim 43 wherein said  
2 destination data change transaction generator generates change  
3 transactions from the destination data for the source.

1           45.    The data transmission system of claim 31 wherein said  
2 differencing transmitter is provided on a server and at least one of said  
3 plurality of differencing receivers is provided in a device including said  
4 data destination.

1           46.    The data transmission system of claim 45 wherein said data  
2 source is provided on a device coupled to the server and the differencing  
3 transmitter.

1           47.    The data transmission system of claim 31 wherein at least  
2 one of said differencing receivers is provided on a server and said  
3 differencing transmitter is provided in a device including said data source.

1           48.    The data transmission system of claim 47 wherein said data  
2 destination is provided on a device coupled to the server and the  
3 differencing transmitter.

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2           49.    A data synchronization system for a first system having a  
3 plurality of data sources each with a data source format, and a second  
4 system having a plurality of data sources each with a data source format;  
5 comprising:  
6                a first data synchronizer on the first system transmitting at  
least one set of difference information to an output; and



7 a second data synchronizer on the second system coupled  
8 to the first system receiving said at least one set of difference  
9 information from the first system.

1 50. The data synchronization system of claim 49 wherein said  
2 difference information comprises change transactions from the data source  
3 to the data destination.

1 51. The data synchronization system of claim 49 wherein each  
2 said data synchronizer comprises:

3 a data source interface;  
4 a copy of a previous state of each said data source;  
5 a source data constructor applying difference information to said  
6 copy; and  
7 a difference information generator.

1 52. The data synchronization system of claim 51 wherein said  
2 difference information is transmitted from said first synchronizer to said  
3 second synchronizer in a universal format.

1 53. The data synchronization system of claim 51 wherein said  
2 data synchronizer includes a plurality of difference source interfaces, each  
3 corresponding to a data source format.

1 54. The data synchronization system of claim 49 wherein said  
2 first system and second system are coupled via a network.

1 55. The data synchronization system of claim 54 wherein said  
2 network is the Internet.

1 56. The data synchronization system of claim 49 wherein said  
2 first system is a server and said second system is a device capable of  
3 communicating with said server.

1 57. The data synchronization system of claim 49 wherein said  
2 first and second systems are coupled to a storage server, and said  
3 difference information is transmitted to said storage server by said first  
4 synchronizer and retrieved from said storage server by said second  
5 synchronizer.

1 58. The data synchronization system of claim 57 wherein said  
2 systems are coupled to said storage server via the Internet.

1 59. The data synchronization system of claim 57 further including  
2 a management server communicating with said first and second data  
3 synchronizers.

1 60. The data synchronization system of claim 59 wherein said  
2 management server indicates a location on the storage server where  
3 difference information for said synchronizers are stored.

1 61. A data synchronization system, comprising:  
2 a server;

3 a first system having a plurality of data file types on the  
4 system;

5 a differencing synchronizer on the first system extracting a  
6 first set of differencing data from the data files on the first system  
7 when the data files on the system are changed, outputting the  
8 differencing data to the server, and retrieving differencing data from  
9 the server and applying it to selected data files on the first system;

10 at least one second system having a second plurality of data  
11 file types on the second system; and

12 a differencing synchronizer on the second system extracting  
13 the differencing data from the data files on the second system when  
14 the data files on the system are changed, outputting the differencing  
15 data to the server, and retrieving the first set of differencing data  
16 from the server and applying it to selected data files on the second  
17 system.

1 62. The system of claim 61 wherein said systems are coupled  
2 to allow transfer of said difference data between systems.

1 63. The system of claim 62 wherein said systems are coupled via  
2 the Internet.

1 64. The system of claim 62 further including a server coupled to  
2 each of said first and second systems to receive, store, and output said  
3 first set and said second set of differencing data.

1 65. The data synchronization system of claim 61 wherein said

2 first system is a server and said second system is a device capable of  
3 communicating with said server

1 66. A method for synchronizing at least a first file and a second  
2 file resident on a first and a second systems, respectively, comprising:

3 (a) determining difference data resulting from changes to  
4 a first file on the first system;

5 (b) transmitting the difference information to a second  
6 system;

7 (c) applying the difference information to generate  
8 change data for the second file; and

9 (d) updating the second file on the second system with  
10 the difference data.

1 67. The method of claim 66 wherein said step of determining  
2 comprises:

3 comparing data from the first file to a copy of a previous state of  
4 data from the first file.

1 68. The method of claim 67 wherein said comparing step  
2 comprises extracting data from said first file, converting said data to a  
3 universal file format, providing said copy of said data in said universal  
4 format, and comparing said data and said copy to provide difference data  
5 in said universal format.

1 69. The method of claim 68 wherein said step of applying  
2 comprises:

3 constructing new file data for said second file in said universal data  
4 format.

1 70. The method of claim 69 wherein said step of updating  
2 comprises translating said new file data into a format of said second file.

1 71. The method of claim 66 wherein said step of transmitting  
2 comprises coupling the first system and the second system to a network  
3 and transmitting said information from the first system to the second  
4 system via the network.

1 72. The method of claim 71 wherein the network is the Internet.

1 73. The method of claim 66 wherein said step of transmitting  
2 comprises coupling the first system and the second system to a server  
3 and transmitting said information from the first system to the server, and  
4 from the server to second system.

1 74. The method of claim 73 wherein said step of coupling  
2 includes coupling the first and second system to the server via a network.

1 75. The method of claim 74 wherein the network is the Internet.